A Blueprint for Change

Executive Summary for the Investigation Report
By Commonwealth Edison
To the Illinois Commerce Commission
Illinois Public Officials
And the Customers of Commonwealth Edison

September 15, 1999

With the publication of the attached Reports, ComEd Chairman John Rowe is announcing today that ComEd has completed a comprehensive investigation into the outages of July and August and the integrity of the entire system. The Investigation Report maps out the specific events, details the recent improvements achieved through round-the-clock inspection, repair and replacement activities, and offers a comprehensive blueprint and preliminary timetable for the steps necessary to ensure that ComEd's service meets or exceeds industry standards.

Completed in a one month, 24-hour-a-day effort, consisting of hundreds of pages of analysis, charts, diagrams and photographs, and central to the $20 million ComEd emergency response effort that was launched in August, industry observers described the Report, the investigation and the ComEd response as "unprecedented" in the history of publicly-owned utilities.

The major findings reveal serious issues in the transmission and distribution system, especially in the areas of system maintenance, planning and design. The intensive investigation was primarily designed as a comprehensive diagnosis concerning the health of the system. In medical terms, the Report concludes that ComEd's transmission and distribution (T&D) system is in serious, but stable condition, and that the overall prognosis is good. Mr. Rowe described the results as "sobering, but essential." "For the first time, we have a clear and complete picture of what and where the problems are," he said. He added: "We also have a clear idea of exactly what needs to be done, and when."

Along with the Report, the company announced a plan today it described as a "two-year recovery program", aimed at bringing service reliability up to or beyond industry norms. As elements in the prioritized action plan, ComEd pledged accelerated and ongoing efforts to address the issues identified by the investigation.

To address the problems related to system inspection and maintenance, ComEd has already launched a 24 hour/7 days a week campaign to repair, replace or upgrade major equipment such as transmission lines, substations, feeder cables and other components. Priority repairs and upgrades will be competed before the start of summer 2000.

To address the T&D system design problems, which stem in part from the sometimes sporadic evolution of the system since the 1930's, ComEd will within 90 days complete a comprehensive System Optimization Study that is intended to map out the changes needed to re-tool the system for service in the next century.

Over the past twelve months, ComEd has been working with the Illinois Commerce Commission (ICC), the City, the Legislature, public interest advocates and others to improve its distribution system in the City of Chicago, in the suburbs and in rural areas.

In October 1998, in response to the extraordinary level of storm-related service interruptions experienced that year and a series of inquiries by the ICC and the Attorney General, ComEd accelerated its tree trimming program (fallen limbs are responsible for approximately 17% of service interruptions) and increased its three-year construction budget by $300 million. ComEd agreed to additional commitments in a May 1999 settlement with the City, bringing the total amount of committed reliability-related improvements in the City to $1.1 billion.

Finally, in discussions with the Legislature, ComEd committed to an additional $2 billion in improvements to the system outside the City over the next five years.

These initiatives demonstrated a commitment by ComEd and the corresponding public officials to improving the T&D system based on the information available at the time.

However, the dramatic events in Chicago over the last 45 days, and the results of the equally dramatic ComEd response, have convinced the company, as well as many customers and public officials, that ComEd's management of its distribution business requires truly radical change. ComEd must:

- **Find the problems in the design and maintenance of the entire system;**
- **Face the problems with clear management accountability; and**
- **Fix the problems so customers across the system receive service which meets and exceeds industry norms.**

ComEd needs a performance revolution in its transmission and distribution system to match the performance revolution it has begun in its nuclear business. This Report sets definite goals and a definite timetable for these radical changes.

Over the past six weeks, ComEd has spent more than $20 million on inspection, investigation, analysis and repair of the T&D system. Looking at the overall construction, operations and maintenance budget, ComEd expects to continue this level of effort, spending $100 million more than originally budgeted over the remainder of the year, and a total of more than $1.5 billion over the next two years. By year-end ComEd will present, to the ICC, the City and others, an enforceable plan detailing what ComEd will spend, where it will be spent, and when the projects will be completed. As part of that plan, ComEd will provide supporting documentation demonstrating the benefits of its proposed spending. ComEd intends to be held accountable for any future failures to get the work done on schedule.

In the end, however, we know that our customers will not judge us on the basis of how much we have spent or how many projects we have completed. Our customers – and the ICC and the City of Chicago – will judge us by *whether we have improved our ability to deliver power in a reliable fashion*.

ComEd's Response to the ICC August 20 Request

As a procedural matter, the attached Investigation Report responds to specific requests in the August 20, 1999 ICC letter to ComEd Chairman John W. Rowe. But moving beyond the specific requests in the August 20 letter, the attached Report is also intended to present the ICC, other government officials and ComEd's customers and stakeholders with a complete, clear snapshot of where ComEd is today. To that end, the Investigation Report provides a comprehensive account of ComEd's investigation and response concerning the service interruptions of July and August in Chicago. It also looks beyond the summer outages and charts a far-reaching course for ComEd's future and for improving performance and reliability for its customers.

In addition, as a companion piece to the Investigation Report, ComEd is releasing under separate cover today the first scheduled Implementation Report under the May 1999 Settlement Agreement with the City of Chicago (Implementation Report), as requested by Mayor Daley in his August 14, 1999 letter to Mr. Rowe. The Implementation Report provides, among other things, details of specific T&D upgrade projects within the City that are currently underway and planned for the immediate future.

One of the purposes of the Investigation Report is to present ComEd's explanation of the latent deficiencies that caused certain parts of the T&D system to fail in late summer, and ComEd's action plan to address them. For much of the past 18 months, ComEd has endeavored to address the obvious faults in the system. But today, although many of the more visible faults have been cleared away, other, less obvious but more substantial

deficiencies are coming to light. The extremely thorough work underlying the Investigation Report has revealed real problems in system design, inspection and maintenance, and in the management of those systems.

These problems have heretofore escaped the recognition of responsible managers and independent evaluations alike. As set forth in the System Reliability section of this Report, the performance of the ComEd system compared favorably with industry norms until stressed by the extremes of weather and load experienced in 1998 and 1999. In the end, it is ComEd's challenge to find and resolve those problems as expeditiously as possible, so that it can continue the business of delivering power and focus on restoring public confidence in its service.

The Investigation Report includes an immense amount of information about ComEd, about how it is organized, how it operates, and how it will improve its reliability of service. With the help of the special task force made up of ComEd specialists and industry experts, ComEd has identified five key areas where it can and will improve its performance:

- **Maintenance**
- **Equipment Protection and Monitoring**
- **Load and Capacity**
- **System Optimization**
- **Organization and Management**

By implementing the recommendations outlined in the Report, ComEd believes it will be able to produce the only kind of results that count – *results that can be seen and felt by ComEd's customers and the officials who represent their interests*.

The Investigation Report is organized around these five critical areas. For each area it provides a detailed account of ComEd's findings, the most urgent concerns identified as a result of those findings, and the steps that ComEd will take or has taken to address those concerns and improve reliability. The Report provides a detailed and comprehensive explanation of the problems ComEd has identified, along with an equally detailed and comprehensive explanation of the proposed solutions. Beginning December 15, 1999, ComEd will present quarterly status reports on the implementation of the program outlined in the Report to the ICC, the City and other appropriate officials.

Background

"Nothing Matters If We Don't Keep the Lights On"

It is certainly fair to say that the events of July and August triggered a series of alarms at ComEd regarding the extent of the T&D challenges ComEd faces. But it would be overly simplistic, and a disservice, to suggest that ComEd, the City, the ICC, public interest advocates, and other concerned leaders were unaware of or unresponsive to the serious nature of the T&D deficiencies long before July 30.

In 1998, the Board of Directors of Unicom, the parent company of ComEd, selected John Rowe to be Chairman and Chief Executive Officer of Unicom and ComEd. Mr. Rowe assumed these positions on March 16, 1998, with a mandate from the Board to deliver increased shareholder value while meeting ComEd's continuing public service responsibilities, implementing the Illinois Restructuring Act and building a competitive energy business.

To ComEd, John Rowe's message from the top was simple and unambiguous, and heard from the very first: "Nothing matters if we don't keep the lights on."

Obviously, "keeping the lights on" is a fundamental requirement of ComEd's public service obligation, and it became the number one objective in Mr. Rowe's strategic plan (Unicom Directions) that was unveiled in July of 1998. However, as a series of mainly weather-related outages occurred over the course of his first eight months with ComEd, Mr. Rowe became increasingly concerned that the public's experience of ComEd's reliability and ComEd's assessment of its own performance did not match up.

Mr. Rowe regularly told public audiences about the internal discussions which reflected this disconnect. "The T&D people tell me we're in the 1st or 2nd quartile for national reliability," he explained. "So I say to them: 'If we're so good – then why are so many customers mad at us?'"

By the fall of 1998, Mr. Rowe was questioning whether the T&D budget was sufficient to address ComEd customer needs, and he asked the T&D division to present a budget that allowed for substantial performance improvements. As a result, ComEd expanded its three-year (1999-2001) capital budget for T&D improvements by $307 million, and its tree-trimming program by $30 million.

And in 1998, John Rowe was far from alone in his concerns about ComEd's distribution operations.

More than a year ago, the ICC, the Mayor of Chicago, the Legislature, the Attorney General, the Citizens Utility Board, several suburban mayors and other respected voices raised serious concerns about the condition of some of the company's T&D equipment and infrastructure. The ICC and the Attorney General, for example, launched a series of inquiries and meetings. The City of Chicago had previously initiated an arbitration

proceeding. ComEd believed at the time, and said through its new Chairman, that the issues raised by these entities were legitimate, and ComEd agreed to address them.

In particular, Mr. Rowe acknowledged that the Mayor had a strong case. As a result, Mr. Rowe decided to settle the arbitration initiated by the City rather than prolong it through litigation. This decision resulted in a historic settlement in which the City secured a binding contractual commitment from ComEd with reliability-related T&D investments and expenditures that tally more than $1 billion. The implementation of that Agreement is the subject of the report to the City which was also released today.

In addition, ComEd's leadership worked in close cooperation with the mayors and the Legislature to bring about the 1999 legislation which resulted in a $2 billion commitment by ComEd to T&D and other upgrades in areas outside the City. But the very fact that the company had previously challenged these legitimate T&D concerns raised an issue at ComEd almost as serious as the problems in the T&D system itself. As Mr. Rowe candidly observed last month: "It is a bad thing when you get better information from the Mayor of Chicago, a variety of aldermen and a variety of suburban mayors than you are getting from your own management reporting channels."

By last winter, Mr. Rowe recognized that ComEd needed an outside expert to help break through logjams in internal information flow, and to bring an independent perspective to the company. In February 1999, Mercer Management, an outside consultant with extensive experience in the industry, was brought in to conduct a comprehensive, unbiased, hard-eyed look at ComEd's service reliability and other critical systems. Substantial portions of that early and continuing assessment are incorporated in the attached Report.

ComEd also sought input from the communities it serves through the Green Board process, which the Chairman launched last winter. ComEd went to the communities to find out how it was doing, then used that information as a touchstone against which to test the T&D claims of the company's internal management personnel. It was an effort to focus not on ComEd's assessment of its programs, but on the customers' views of their service.

The process worked. Out of more than 400 participating wards and municipalities, 31 communities initially rated as "red", meaning that service was unacceptable. Less than a year later, the company's concentrated response had reduced the number to only two (though the number increased to eight after this summer's outages). The process also served as a kind of an early warning system, helping ComEd's leadership to quickly identify and respond to communities where reliability problems needed the most attention. For example, before 1999, the Village of Flossmoor had experienced what the Mayor described as frequent, lengthy and intolerable service interruptions. Following a focussed response via the Green Board process, the Mayor saluted the local ComEd manager for his "extraordinary performance" and thanked John Rowe for his "leadership in redirecting ComEd priorities and funds to the issue of electric reliability and particularly for the work

that has been performed to date in our Village."

For all these reasons, in the spring of 1999 – four months before the events of July 30 – ComEd began searching for a new leader to take over the T&D team and guide it through the major upgrades promised to the City and the Legislature. The company tapped Carl Croskey, a respected figure in the energy distribution industry with a solid

reputation and 25 years of experience. But before Mr. Croskey could even start, the lights in West Bucktown began flickering out.

What Went Wrong?

As is now widely known, and as was spelled out in some detail in ComEd's September 1, 1999 chronology to the Mayor of Chicago, the first major blackout of the city's late summer heatwave began beneath the manholes which dot California Avenue. In the early morning hours of Friday, July 30, the 12 kilovolt line feeding into Cortland Substation's Transformer 1 short circuited. ComEd switched the customers served by that line to one of the two remaining transformers, and service continued largely uninterrupted until late in the morning.

Then at 11:24 a.m. the cable known as Line 5348 suffered a fault feeding into Cortland's Transformer 3. The fault triggered the circuit breaker on Line 5348 and Transformer 3 went down. And in the first of the series of domino falls that were to plague the city that weekend, the last remaining transformer at Cortland then began to overload. Within minutes it, too, was shut down, and with it went Cortland Substation and over 10,000 customers. It was the hottest day of the summer, and the hands on the clocks in West Bucktown had stopped at just about high noon.

ComEd dispatched a work crew immediately. The workers were inside the manhole and had the cable repaired in little more than an hour. But as was later reported in the press, what they did not know was that Line 5348 had failed in not one place, but two. A smaller fault was lurking behind the larger one, where it could not be detected by test equipment. When the switch was thrown and the cable re-energized, the hidden fault shorted out and two more transformers went down, this time at the Northwest Substation. By 4:30 p.m. the power was gone and the AC was out in nearly 100,000 homes centered around Independence Park.

But despite the stopped clocks, alarms bells were ringing across the city as concerned officials at ComEd, the ICC, the City and other organizations realized that the situation they had feared and worked together for months to prevent was now unfolding during what the *Chicago Tribune* later calculated was the fourth hottest week of the century.

As all of Chicago is now only too aware, the hidden fault on Line 5348 and the

shutdown at the Cortland Substation was only the beginning. Cortland marked the first of a series of outages that weekend, spanning four days as July rolled into August. Public anger rose along with the temperature as a series of T&D components failed over the next five weeks, disrupting activities throughout the city. The manhole fires at Cortland Avenue on August 9 and 10 left more than 8,200 customers without power. Failures at two substations resulted in the Loop outages of August 12, sparking business closures and traffic disruptions as workers went home early. Ten days later another outage affected three Chicago icons – Meigs Field, Lake Shore Drive and the Field Museum. And when three out of four transformers at a downtown substation failed, another icon was in the news as service to the Richard J. Daley Center was disrupted just as the business day began.

ComEd's Emergency Response

The unrelenting series of highly visible, back-to-back service interruptions which struck in July and August dramatically exposed the true depth of problems that have troubled customers, ComEd and public officials for a number of years. The company's response was unprecedented.

ComEd hit the ground running. The Chairman spoke plainly to the public. ComEd met frequently with concerned and involved representatives of the ICC, the City of Chicago and various wards and municipalities to keep them apprised of ComEd's progress and to invite and welcome their input.

Two days before the August 12 outage, Mr. Rowe assigned David Helwig to head up a new T&D task force to address the outages. Mr. Helwig is one of the industry's most experienced turnaround experts and a skilled engineer with a background in both T&D and nuclear programs. Working under Oliver Kingsley, Mr. Helwig had already been recognized for his success and discipline in introducing fundamental change within ComEd's troubled nuclear programs, and Mr. Rowe asked him to step in and bring the same focus to T&D improvements. Within 48 hours, Mr. Helwig's mission was expanded to running the T&D organization on an interim basis, pending the arrival of Carl Croskey, and to leading an emergency, system-wide assessment of the condition of the equipment.

By the time the last service was restored on August 12, ComEd had already dispatched more than 700 men and women to open manholes and explore substations across the City in a broad but focused effort to search out and prevent any avoidable interruptions. All told, during the past six weeks, ComEd devoted an estimated 250,000 additional manhours and over $20 million to the response, above and beyond normal operations.

According to industry professionals, the month-long effort which began on August 10 is unprecedented in its speed, scope and intensity. Dr. Karl E. Stahlkopf, Vice President – Power Delivery at the Electric Power Research Institute (EPRI), is recognized

throughout North America as one of the industry's most experienced and respected experts. Dr. Stahlkopf has participated closely in ComEd's investigation since shortly after it began. Comparing ComEd's mobilization of people, money and material to Operation Desert Storm, Dr. Stahlkopf called it "the fastest, fullest, most comprehensive T&D investigation ever launched in the history of the industry." Dr. Stahlkopf characterized both the investigation and the resulting Report as a "clear-eyed, hard-hitting effort by the company to take a blunt look at itself, its equipment, its design, its personnel and its operations."

The overall response has proceeded on two parallel tracks. The first mission was to inspect and assess the actual equipment—the material condition assessment. The second parallel mission was the expert analysis of the system design itself.

For the material condition assessment, one of the most critical imperatives was to map out and identify the nature and extent of the most serious and time-sensitive challenges, and to do so quickly. The scope of the tasks completed in the days since the outages is nothing short of extraordinary. During the first ten days alone, ComEd employees inspected virtually every one of ComEd's 888 substations. They completed some 1387 inspections of the underground system alone. By August 30 – barely two weeks after the task force was first convened – ComEd employees had identified 212 potential faults in cables and transformers, and had already repaired 114 of them.

In tandem with this massive assessment of the material condition of its T&D system, Mr. Helwig assembled a team of the most experienced experts in America to assess the operation and management of its T&D system, drawing extensively on the technical expertise of the EPRI and consulting with such industry leaders as General Electric, Kenny Construction and Asea Brown Boveri (ABB).

By August 14 (two days after the critical failures that shut down the South Loop), ComEd had already assembled 25 best-in-class technical experts from the EPRI to assist with a technical review of system capabilities. Known worldwide as the preeminent electric power research and development organization, the EPRI experts were chartered with leading a complete, "no holds barred" assessment of ComEd's system deficiencies. Working almost non-stop for 12 days, many of these experts have participated since the beginning of this investigation. The results of their work were presented to a panel of industry experts in formal sessions on August 26 and September 10. The panel acted with new voices to challenge old ways of thinking, and to present solutions ranging from time-tested to cutting edge. ComEd has also extended invitations to the ICC and the City of Chicago, who have been participating in the investigation and weighing the analysis as the results of ComEd's technical review panels began to pour in.

With brutal candor, and with aggressive specificity, both ComEd's own professionals and its team of nationally recognized experts from outside the company have been probing, testing and scrutinizing the T&D system, and ComEd has taken an

unflinching look at an unflattering reflection. The attached Report is the result of that initial search.

But ComEd recognizes that people are not only asking about what happened to Line 5348 at Cortland Substation. People are not only asking about what happened to the cable. They also want to know what happened to ComEd.

The real answer to that question does not turn on which lines short-circuited or which transformers overheated or which substations lost power. The real answer to that question must address why all of the many fail-safes and redundancies programmed into the system failed to prevent the outages. And that answer is a slightly longer story.

Task Force Findings – Latent Deficiencies in Cables and Companies

As with the hidden fault on Line 5348, ComEd has found that it solved one set of problems only to find another set lurking behind the first. Not all of them can be quickly fixed.

ComEd understood that there were issues with its T&D system – that is why it had been working so closely over the past year with the ICC, the City and numerous other interested parties to address those problems. Nevertheless, the extent of the problem was not anticipated. There are serious issues with both the maintenance and the design of the system. But with the initial investigation complete, these issues can now be fully addressed.

The findings of the investigation are based substantially, but not exclusively, on investigations by the task force. July 30 was not the first time alarm bells rang on this watch. The ICC, the Mayor of Chicago, and Mr. Rowe all raised concerns about ComEd's T&D system as much as 18 months ago, and have put a great deal of effort into identifying and prioritizing the T&D challenges and projections leading into the year 2000 and beyond. Some of the credit for the impressive results the task force was able to generate in such a short time must go to these parties, and to the far-ranging evaluation, debate and cooperative analysis that they contributed to the matter.

As noted above, ComEd has identified five areas of operations in which it failed to meet the expectations of itself and its customers. A detailed description of the steps ComEd has taken and will continue to take in pursuit of improvement is set forth below and in the Report. Given the recent outages, however, today both ComEd and the community have come to recognize that the problems identified in its earlier assessments run farther and deeper than could previously have been understood, and that each of these five factors played a part in the outages of July and August 1999.

(1) Maintenance: As the tortured summer saga of Line 5348 suggests, the investigation found that a utility like ComEd needs to be painstaking in the care and feeding of its T&D components. The team found that other major cities operate T&D

equipment that is no newer, no older -- not fundamentally different from ComEd's. The task force findings pinpoint the crucial difference between ComEd's equipment – which failed this summer – and similar systems elsewhere that did not: ComEd has been unable to provide the rigorous care and maintenance that the T&D system requires for optimal reliability.

It was generally found that while ComEd's inspection programs seemed appropriate, there were only imperfect mechanisms in place to ensure execution. It looked good on paper, but the repeated outages made the truth of the matter painfully clear. It is not certain, from a review of the records, how often inspections were actually performed, and the inspections that were performed may have been too passive, too cursory, to truly maintain the system.

Additionally, the Report concludes that ComEd needs to ensure better follow-up on maintenance requests. While virtually all T&D emergencies are dealt with immediately, there appear to be altogether too many deficiencies which, had they been identified and addressed sooner, would not have become critical in the first place. Too often, the priority of requests for maintenance was not recognized, and the request was simply added to a list. The Report also indicates that routine maintenance requests on the list were rarely tracked to ensure follow-up, and that the list was rarely updated to indicate which requests had already been addressed.

Specifically, the Investigation Report presents the following findings about ComEd's maintenance program:

- Management Systems. ComEd's maintenance program is hampered by incomplete definition, lack of focus, historic budget swings, suboptimal work planning and inconsistent supervision.

- Equipment Monitoring and Capacity Management. Too much of ComEd's maintenance work is reactive rather than preventive, driven by actual or pending equipment failures, because of insufficient monitoring and inadequate capacity (monitoring and capacity are discussed separately below).

- Program Execution**.** ComEd's maintenance program has been hindered because of gaps in equipment condition monitoring, inconsistent training and work practices, and unclear priorities.

- Recordkeeping and Documentation**.** ComEd maintenance efforts are often made more difficult by incomplete operating histories of components due to gaps in data capture, inattention to detail, and lack of workforce discipline.

Solution. ComEd has already begun to implement the experts' recommendations

regarding its maintenance program. First and foremost, ComEd has continued the massive inspection and repair program that it initiated on August 10. This intensive effort has been sustained across all areas of the T&D system and (as of September 10) led to:

- 4,346 completed, state-of-the-art inspections
- 8,828 items requiring maintenance
- 2,304 completed repairs

The details of these efforts are contained in the Report. ComEd will continue with its accelerated inspection and repair program. The Report makes detailed recommendations regarding the required maintenance of every aspect of ComEd's T&D system, but the general thrust of the recommendations is simple: provide the necessary authority and make the managers directly accountable for the performance of the system. That one, single change will carry all the other changes in procedures (different inspection schedules, methods, records, and tracking) down to the people who have to implement them.

(2) Equipment Protection and Monitoring: As mentioned above, ComEd's physical equipment is largely comparable to that of other utilities in major metropolitan areas. In addition to improving its maintenance practices, however, ComEd needs to strengthen its equipment monitoring and protection. By improving its monitoring practices, ComEd will be better able to predict when certain types and pieces of equipment are likely to wear out or fail. Predicting (and thus preventing) the on-line failure of a component helps protect the equipment around it: when one component fails, the power originally carried by that component must travel through alternative routes using the surrounding components. This is what happened on July 30, when the sudden overload caused by the failure of Line 5348 acted to shut down the adjacent transformers.

Specifically, the Investigation Report presents the following findings about ComEd's equipment protection and monitoring:

- Maintenance Program Ownership. It was not always clear who was responsible for specific elements of ComEd's protection and monitoring program. Even when the responsible party was clearly identified, he or she was not always held accountable, in a meaningful way, for the performance of those elements.

- Calibration Maintenance. ComEd has not kept pace with the necessary relay calibrations, and its efforts to do so are hampered by the same types of issues described above with respect to other types of systems maintenance.

- Root Cause Analysis. ComEd has not effectively tracked and analyzed information about relay failures, and thus cannot analyze or address the root causes of those failures.

- Equipment Condition Monitoring. ComEd has not implemented a consistent program of equipment monitoring across its system, thus limiting its ability to detect incipient failures.

Solution. As with the maintenance program, the Report makes detailed recommendations regarding the protection and monitoring of ComEd's T&D equipment, including the utilization of readily available but state-of-the art monitoring devices. Also as with the maintenance program, the general thrust of the recommendations is to give managers the necessary authority and then make them directly accountable for the performance of the system.

(3) T&D Load and Capacity: It is obvious from the system failures this summer that the ComEd power delivery system is overloaded at some points. ComEd was aware that certain substations were overloaded at times of peak summer demand and was working to address the situation as outlined in its agreement with the City of Chicago. But the recent investigation revealed that the extent of the problem had been underestimated. ComEd's experts calculate that the T&D system is five to ten percent deficient in its capacity to carry the peak load which must be contemplated in the wake of this summer's experiences. The problem is not a lack of power. Between construction, importation and its fleet of nuclear plants, ComEd expects to have a sufficient supply of power. The problem is that the distribution system cannot reliably deliver the power to its customers at peak times. ComEd needs to redesign some parts of its system to make better use of the physical components that are already in place, and invest in greater capacity to help it carry the load.

Specifically, the Investigation Report presents the following findings about the load and capacity of ComEd's T&D system:

- Substation Capacity. Upon initial review, it appears that almost a third of ComEd's large substations (approximately 73) operate above capacity at times of peak demand, and that 27 of those substations require expedited corrective actions. Three of those 27 substations are located in the City of Chicago (Crosby at 1180 North Crosby, Lakeview at 1141 West Diversey, and Northwest at 3501 North California), and 24 are located outside the City.

- Distribution Feeder Capacity. Upon initial review, it appears that almost one fifth of ComEd's small substations and feeders (approximately 880) operate above capacity at times of peak demand; 185 of those small substations and feeders are located in the City.

ComEd has already begun to implement the experts' recommendations regarding load and capacity issues. ComEd is continuing its ongoing assessment of the load and

capacity of its existing substations in order to properly prioritize necessary repair and replacement. At the same time, ComEd is working to determine which substations will required additional equipment – or where ComEd will need additional substations – and how ComEd will surmount the difficulties inherent in expanding or installing substation capacity. ComEd will repair, upgrade or otherwise increase the capacity of the substations requiring expedited action by June 15, 2000. The other substations will be addressed by June 15, 2001. The extensive improvements to the material condition of the equipment will also help ease the load on the transformers until all of the various repairs, replacements, and additions are completed.

(4) T&D System Optimization: The distribution system serving downtown Chicago has evolved over the years to a condition that is particularly sensitive to inaccuracies in planning and the impacts of maintenance outages and equipment failures. Its apparent radial design is really an arrangement of radial arms of electrical loops similar to that employed in many highly reliable European designs, except with less capacity and configuration redundancy. It is the uniformly high loads carried on the system and the limited load transfer capability which combine to make this an unforgiving situation. Additionally, the ComEd system was found to contain some unique and limiting features which compound the impact of equipment outages and failures.

Achievement of improved service reliability will require the careful balancing of capacity additions and configuration enhancements.

Specifically, the Investigation Report presents the following findings about the load and capacity of ComEd's system design:

- System Design. ComEd's downtown distribution system lacks some of the features which provide high reliability and flexibility in other US and European designs.

- Delivery Capacity. Additional power delivery capacity is needed to provide the operating flexibility and contingency management capability needed to ensure highly reliable service.

- System Operation. Traditional contingency planning criteria applied to this system will not provide the requisite reliability for such an important area.

Solution. ComEd has already begun to implement the experts' recommendations with regard to its system design. Recognizing that quality system design is the fundamental building block for delivering reliable service, ComEd has retained Asea Brown Boveri (ABB) to collaborate with ComEd system planners to diagnose faults in the system design and identify ways to remedy those faults. Led by Lee Willis, a world- renowned expert in electric utility system planning, ABB is objectively reviewing the design and performance of ComEd's T&D system. Using advanced, proprietary models to understand the dynamics

of power flows, ABB has completed its initial diagnostic review comparing ComEd's system to other designs, evaluating the system's capability to deliver reliable service, and considering options for improvement.

With ABB's preliminary analysis complete, ComEd is now in a position to go forward with the more detailed assessment that is currently underway. The ongoing System Optimization Study, which will be complete by year-end, involves further system modeling and sensitivity analyses. The study will identify the best way to increase the capacity of the system through some combination of capacity improvements (e.g., increased transformer and line capacity) and configuration enhancements (e.g., loops and networking, more and better switching). A number of the world's foremost equipment manufacturers have been asked to devise practical solutions tailored to the system's needs in order to implement those solutions as quickly as possible. Until that time, ComEd will focus on improving efforts at upgrading, maintaining and monitoring the system in its current configuration.

(5) Organization and Management: As the results of the investigation have unfolded, a wide variety of underlying organization and management issues have surfaced. A series of realignment workshops used to establish the transition organization for T&D (as described below) identified further evidence of the same issues, confirming the findings of the investigation with respect to organization and management issues. The issues identified in the Report fall into five categories, all related to just "doing the work": leadership, organization design, work processes, information systems and staff.

Solution. As with the other areas of concern identified in the investigation, ComEd's senior management and the interim T&D leadership moved immediately to implement the experts' recommendations with regard to ComEd's organization and management. Over the past 45 days ComEd has made selective changes to the composition of the T&D senior management team and has established a disciplined, interim organization to implement the immediate drive to inspect and repair the system components. This interim organization has already initiated many of the internal measures recommended by the experts, including:

- Re-evaluating the entire T&D budget to ensure that resources are being allocated to the programs that will most benefit from expenditures.

- Developing specific performance goals for the T&D program, to assist in gauging (and enforcing) progress.

- A general "house cleaning" -- e.g., inserting of new leadership, participating in a public and no-holds-barred review of shortcomings, and instigating stepped-up employee dialogue and communications.

To the extent that ComEd's efforts along these lines have already yielded results, those

results are set forth in the Report.

Although these moves only scratch the surface, they have set the stage for a more thorough restructuring of the T&D organization. Among the initiatives that ComEd will pursue over the next 90 days (set forth in detail in the Report), ComEd will:

- Aggressively recruit new members for the T&D management team and provide additional training for existing managers.

- Educate employees about new practices and goals, then hold them accountable for the attainment and implementation of those practices and goals.

- Track the continuing execution of the many new programs that ComEd has set in motion over the last 45 days.

Each of these five factors – maintenance, equipment protection and monitoring, load and capacity, system optimization, and organization and management – likely played some role in the outages that occurred in July and August. Improvements in these five areas will go a long way toward preventing similar service interruptions in the future. ComEd expects the results of the above actions to be as significant and far-reaching as those recently brought about by Oliver Kingsley and David Helwig in ComEd's Nuclear Generation Group.

A Blueprint for Change

The Road Ahead

The Mayor has said that the company needs to start at Ground Zero.

He says ComEd had better change.

We agree. **And we have.**

ComEd recognizes that fundamental change in T&D performance requires an across-the-board effort. *A chain is only as strong as its weakest link*.

That is why, with this Report, ComEd is announcing a new, two-year recovery program, designed to accelerate fundamental change within Commonwealth Edison. It calls for new initiatives and new ideas that range across the board. A five part plan that calls for new people, new programs, new perspectives, new proposals –

and most importantly – new performance.

New People

ComEd is seeking to recruit and promote a new generation of managers and leaders with vision, discipline and talent. Under the new leadership of professionals like John Rowe, David Helwig and Carl Croskey, that process has already begun. For example, for the next several weeks, David Helwig will continue to direct the investigation into the summer's outages and the efforts to create a program to address the problems identified in that investigation. Carl Croskey, joined by other new leaders, will take over the execution of the program in his capacity as Senior Vice President in charge of ComEd's energy delivery business.

New Programs

ComEd is seeking and proposing core, fundamental change. New programs mean new discipline and accountability, especially for the T&D maintenance programs. It means accelerating steps to protect vital equipment and to monitor it with simple, readily available and yet state-of-the-art technology. It means advancing construction and enhancement programs to increase system capacity. And most of all it goes directly to ComEd's plans for a highly focussed effort to identify and design a system that is fully optimized and ready to meet the needs of a new century.

New Perspectives

ComEd recognizes the benefits of the cleansing power of daylight. ComEd and its customers will benefit from the continued, bare-knuckled scrutiny by the public, public officials and outside experts representing many disciplines and perspectives.

ComEd invites this scrutiny and also welcomes appropriate participation by the ICC, the City, the Attorney General, Cook County, the Citizens Utility Board, suburban municipalities and other interested parties. Throughout its investigation ComEd has invited each of these entities to forge a cooperative, forward-looking partnership to address the most crucial needs of the people we collectively serve. And ComEd remains ready to join in such a partnership now.

New Performance

ComEd stands ready today to match rhetoric with resources – a commitment of bottom-line dollars to the largest, most accelerated capital improvement program in the history of the company.

This new and accelerated commitment of dollars represents not only ComEd's investment in the future – but also its confidence in the future. ComEd understands why people are angry, and why people want more than another series of promises. Both the

public, and the public officials who represent them, deserve to know that these new pledges are backed up by hard dates, firm standards and an enforceable timetable.

Timetable

ComEd has already accomplished much. In the words of John Rowe, ComEd's employees "have worked with ever-increasing intensity, making radical improvements in record time." But there is still much more to be done. Over the next three months ComEd will continue to implement the recommendations set forth in the Report. ComEd will be laying cable, installing monitors, training inspectors and upgrading transformers. Each of these steps is part of a larger, front-loaded program, which ComEd will continue to implement over the next two years:

By December 15, 1999:

System Load, Capacity and Design

- Complete Comprehensive T&D System Optimization Study
- Establish and Prioritize Plans to Relieve Load Capacity Shortfalls
- Establish New ComEd Planning Criteria for Forecasting Load
- Complete Sensitivity Analyses Needed to Prioritize Work

Inspection, Maintenance and Monitoring

- Submit 1st Quarterly Status Report to ICC, City and Others
- Establish New Process for Scheduling and Allocating Field Work (including maintenance and monitoring)
- Continue Acceleration of ComEd Vegetation Management Program
- Establish New Schedule for Inspections; Replace Faulty Monitoring Equipment

Management

- Redesign Organization, Core Processes and Information Systems/Technology
- Establish Processes to Enhance and Enforce Commitment Tracking (such as repairs, replacements, upgrades, etc.)

City Projects (as per Settlement Agreement)

- LaSalle Substation: install and activate second 138 kV transformer
- Northwest Substation: develop plan for upgrades
- Kingsbury/Ohio Substations: develop plans to accelerate upgrades
- State Line to Taylor: complete installation of 138kV line (#0702)

By June 15, 2000:

System Load, Capacity and Design

- Repair, Replace or Upgrade the 27, High Priority, Major Substations
- Repair, Replace or Upgrade All Identified, High Priority, Small Substations and Feeders

Inspection and Maintenance

- Submit 2nd & 3rd Quarterly Status Reports to ICC, City and Others (on March 15 and June 15, respectively)
- Optimize Maintenance & Tracking on Any Remaining Substations and Feeders (major and small and feeders operating in excess of capacity)
- Achieve 4-Year Tree Trimming Cycle
- Complete Aerial Inspection of Overhead Transmission Lines

City Projects (as per Settlement Agreement)

- Washington Park to Taylor: complete installation of third 138kV line (#13701)
- Northwest Substation: complete upgrade of Terminal 2 12kV switchgear

By December 15, 2000:

Maintenance

- Submit 4th & 5th Quarterly Status Reports to ICC, City and Others (on September 15 and December 15, respectively)
- Establish Single Source Data Base for Misoperation Information

System Design

- Implement Performance Metrics for Capacity Planning

Management

- Implement a Fully Integrated Work Management Program at ComEd

By June 15, 2001:

System Load, Capacity and Design

- Repair, Replace or Upgrade Any Remaining, High Priority, Major Substations
- Repair, Replace or Upgrade Any Remaining, High Priority, Small Substations and Feeders

Maintenance

- Optimize Maintenance and Tracking on Any Remaining Substations (operating in excess of capacity)
- Submit 6th & 7th Quarterly Status Reports to ICC, City and Others (on March 15 and June 15, respectively)

ComEd has set a formidable series of tasks for itself. We know that fundamental change takes time. To complete the revolution described here today will take more than the 45 days since the outages that have outraged many customers. ComEd will have a better perspective on the final timetable when the System Optimization Study is issued in December, but it intends that those changes will take place over a two-year timetable.

But far sooner than this, we intend to, indeed we must, produce discernable and measurable improvements in performance. By next summer, ComEd's customers will be experiencing fewer interruptions, and those that do occur will be shorter in duration. Make no mistake, however. So long as there are snowstorms, windstorms, wildlife and Mother Nature's trick bag, there will always be times when electrical power systems fail. The commitment ComEd is undertaking is to bring its performance up to the highest levels that can be achieved within the limits of the practical world in which we live.

The events of the past two months have been sobering to everyone in the ComEd house. There is no satisfaction in finding these problems. But there is some satisfaction, at long last, in facing them.

And at the same time, in closing, some real world perspective is in order. As noted at the outset, in medical terms, the T&D system is in serious but stable condition. The prognosis – including the immediate prognosis – is, in fact, good. As the *New York Times* observed on Monday, reporting the views of the North American Electric Reliability Council, our utility systems are not falling apart.

Yes, America this summer suffered a troubling series of major outages. New York City was hit by its worst blackout in over 20 years. Half a million customers lost power in New Orleans. In both these cities, as in Chicago, the systems proved vulnerable to the twin summer challenges of extreme heat and extreme demand.

But today autumn is coming to Illinois and with it a seasonal reduction in both temperature and demand. Given the extraordinary, accelerated and highly focussed T&D improvement campaign that was launched a month ago, ComEd is staking its future on its ability to meet next summer's challenges before Memorial Day comes to pass.

ComEd knows that it has to act quickly. ComEd understands that, with the release of this Report, the time for explanations is past. ComEd recognizes that, from this day forward, it will be judged by only one measure – performance.

We are aiming higher – for our company, for our customers and for the communities we serve – yours. And make no mistake. The end goal of this response, and the overall goal of this company, is to ensure that – among America's major metropolitan utilities – Chicago and ComEd are second to none.

As for anything less, John Rowe put it bluntly in the aftermath of the August outages. He said: **"I will not tolerate it. And you will not have to."**

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